

## PATENT COOPERATION TREATY

## PCT



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 22 APR 2005

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Applicant's or agent's file reference 302525WO/CMH/JE/ms		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB 03/06502	International filing date (day/month/year) 03.11.2003	Priority date (day/month/year) 20.12.2002	
International Patent Classification (IPC) or both national classification and IPC C07C6/04			
Applicant SASOL TECHNOLOGY (UK) LTD et al			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 19.07.2004		Date of completion of this report 25.04.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer O'Sullivan, P Telephone No. +31 70 340-4511 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/IB 03/06502**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-35, 37 as originally filed  
36 received on 16.03.2005 with letter of 16.03.2005

**Claims, Numbers**

2-25 as originally filed  
1 received on 16.03.2005 with letter of 16.03.2005

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/B 03/06502

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6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-24
	No: Claims	25
Inventive step (IS)	Yes: Claims	1-24
	No: Claims	25
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

2. Citations and explanations

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: SAMAK, B A ET AL: "Dramatic solvent effects on ring-opening metathesis polymerization of cycloalkenes" JOURNAL OF MOLECULAR CATALYSIS. A, CHEMICAL., vol. 160, 2000, pages 13-21, XP002278753 ELSEVIER, AMSTERDAM., NL ISSN: 1381-1169
- D2: NGUYEN S T ET AL: "SYNTHESIS AND ACTIVITIES OF NEW SINGLE-COMPONENT, RUTHENIUM-BASED OLEFIN METATHESIS CATALYSTS" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, AMERICAN CHEMICAL SOCIETY, WASHINGTON, DC, US, vol. 115, no. 21, 1993, pages 9858-9859, XP002067273 ISSN: 0002-7863

**1. Novelty**

D1 discloses the use of phenol to as a solvent in which it causes, for example, alternating ROM copolymerisation of norbornene and cyclopentene. No explicit mention of changes in reaction rate due to the phenolic solvent is to be found therein.

D2 discloses new  $\sigma$ -donating alkylphosphine substituted Grubb's catalysts which are more effective in the metathesis of cis-2-pentene (D2, table I). No reference is made in D1 of the use of phenolic compounds in the reaction mixture.

Claims 1-24 are therefore novel.

Claims for products defined in terms of a process of manufacture are only admissible if the products as such fulfill the requirements for patentability, i.e. inter alia that they are new and inventive. A product is not rendered novel merely by the fact that it is produced by means of a new process. The metathesis of cis-2-pentene with catalysts falling under the scope of the present application is disclosed in D2, table I. Since the phenolic additives of the present application only serve to increase the efficiency of the catalyst, the products are the same. Claim 25 therefore does not fulfill the requirements of Art 33(2) PCT.

## **2. Inventive Step (Art 33(3) PCT)**

The document D2 is regarded as being the closest prior art to the subject-matter of claim 1 since it discloses the production of the same products from the same starting material using the same catalyst (D2, table I). D2 does not disclose the use of a phenolic additive. The effect of this difference, as shown in the examples currently on file, is that the reaction rate (i.e. the efficiency of the catalyst) is increased. The problem underlying the present application may therefore be formulated as the provision of a process for the metathesis of two non-cyclic olefinic compounds in the presence of the catalyst (I) of claim 1. The solution is the use of phenolic additives. The solution is not considered obvious in the light of the prior art because the skilled man would not have looked to D1 to supplement the information given in D1. D2 is not concerned with metathesis or cross-metathesis but with ROMP. Additionally, the skilled man would not have combined the teaching of D1 with that of D2 since although phenols may be used as solvent in the process of D1, there is no indication that this increases the rate of reaction. Rather, it causes alternating copolymerisation of two monomers, a process irrelevant to the present problem. The subject-matter of claims 1-24 therefore fulfills the requirements of Art 33(3) PCT.

Results are shown in table 16 below. It is evident that the enhancing effect of phenol is observed for different types of first generation Grubbs catalysts, including those with different neutral ligands and different anionic ligands.

**Table 16:** Metathesis of 1-octene using different catalysts with and without phenol.

Catalyst	Molar % Conversion of 1-Octene after 3h without added phenol	Molar % Conversion of 1-Octene after 3h with added phenol
$\text{RuCl}_2(\text{PCy}_3)_2(=\text{CHPh})$	26%	83%
$\text{RuCl}_2(\text{PCp}_3)_2(=\text{CHPh})$	2%	24%
$\text{RuBr}_2(\text{PCy}_3)_2(=\text{CHPh})$	15%	52%
$\text{RuCl}_2(\text{PCy}_3)(\text{Py})_2(=\text{CHPh})$	3%	9%

Where:

Py = pyridine

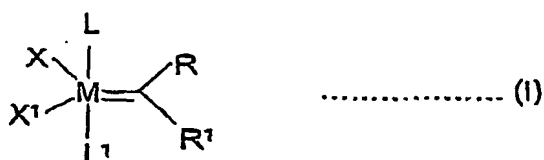
Ph = phenyl

Cp = cyclopentyl

Example 13 – Performing the Reaction at Low Catalyst Loadings.

CLAIMS

1. A metathesis reaction between at least two olefinic compounds which are the same or different, each olefinic compound comprising a non-cyclic olefin  
5 or a compound which includes a non-cyclic olefinic moiety; the metathesis reaction being carried out in the presence of a catalyst of formula (I):



wherein:

M is ruthenium or osmium;

10 X and X<sup>1</sup> are independently selected from an anionic ligand;

R and R<sup>1</sup> are independently selected from H or an organyl group;  
and

L and L<sup>1</sup> are independently selected from any neutral electron donor ligand, provided that neither L or L<sup>1</sup> comprises a N-heterocyclic carbene compound wherein the carbene carbon atom  
15 is co-ordinated to M;

and the metathesis reaction being characterised therein that it is carried out in the presence of a phenolic compound in the form of a phenol or a  
20 substituted phenol, which substituted phenol includes at least one hydroxyl and at least one further moiety other than H and OH attached to an arene ring.